Vaginal Douching and Reduced Fertility

ABSTRACT

Objectives. This study investigated douching and reduced fertility.

Methods. The monthly probability of conception for douchers and nondouchers was compared in a sample of 840 married, parous women in King County, Washington. Data on the number of months required to conceive were analyzed.

Results. In comparison with nondouchers, women who douched were 30% less likely to become pregnant each month they attempted pregnancy. This relationship remained after adjustment for covariates, and it could not be explained by women douching for medical reasons. The reduction was not related to the type of douching preparation used. Young women who douched had significantly greater reductions in monthly fertility than older women (50% reduction for women 18 to 24 years old, 29% reduction for women 25 to 29 years old, and 6% reduction for women 30 to 39 years old).

Conclusions. Douching was associated with reduced fertility. Further research is needed to determine whether the relationship is causal and, if so, to what extent it is mediated by pelvic infection. In the meantime, women should be informed that douching may have adverse effects. (*Am J Public Health.* 1996;86:844–850)

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Introduction

Vaginal douching has been practiced throughout recorded history.[1] A wide variety of douching preparations have been used: garlic and wine (noted in the Egyptian Papyrus of 1500 B.C. as a treatment for menstrual disorders[2]), dilute Lysol (advertised in the early 20th century in the United States for regular feminine hygiene and for contraception[1]), and water and vinegar (commonly used today[3–5]). Historically, the medical community recommended douching for treatment of specific gynecologic conditions[6,7] but was divided about the efficacy and safety of regular douching as a hygiene practice among healthy women.[1,8,9]

Vaginal douching remains a common practice among women in the United States. In a national survey conducted in 1988, 37% of women between the ages of 15 and 44 years reported douching; 18% douched at least once a week.[10] Black women were about twice as likely to douche as White women (67% vs 32%), and those who did tended to douche more frequently.

Douching may not be benign. It has been linked to increased risk of chlamydia infection,[11,12] pelvic inflammatory disease,[4,10,13–17] and ectopic pregnancy[5,18–20] (but see Phillips et al.[21]). Independent associations were demonstrated even in studies that controlled for the reason for douching and for sociobehavioral correlates including sexual behavior.[5,15] Reports linking douching to vaginal and cervical cancer raise further concerns about the safety of the practice.[22–24]

A relationship between douching and reduced fertility, a common sequela of both clinical and silent pelvic inflammatory disease, has been addressed in only one report.[25] This case–control study of tubal infertility found an association between douching and infertility among both those with and those without prior diagnosis of pelvic inflammatory disease but no increase in risk with increased frequency of douching. Fertility impairment is a difficult medical problem to study with standard epidemiologic methods because only a self-selected minority of women with fertility problems seek treatment.[26] To avoid the problems inherent in studying infertility patients, we compared the fertility of douchers and nondouchers by collecting information on the number of months parous women required to become pregnant. This method of studying fertility in women who are able to conceive[27] has been used previously to investigate effects of such factors as oral contraceptive use,[28] cigarette smoking,[29,30] and occupational exposures.[31,32] The method will tend to underestimate an adverse effect of douching on fertility because sterile women are excluded by design.

Methods

We compared the monthly probability of conception for douchers and nondouchers in married, parous women. The

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women studied were controls from a population-based case–control study of infertility conducted in King County, Washington.[33] Married mothers were selected from birth certificate files matched to cases on race, age (within 5 years), census tract, and gravidity at the time of the pregnancy attempt. Of the women selected, 1026 (74%) were interviewed. Women who were under the age of 18 years (n = 9), who had diabetes (n = 9), or who were on medication for seizures (n = 6) were excluded. No meaningful time to pregnancy could be derived for 133 additional women, most of whom reported that they conceived while using contraception. Because the detailed questions from which we derived our douching categories were not included in the first few interviews, another 29 women were excluded. The final sample for analysis consisted of 840 women.

Data on time to pregnancy, douching, and other factors potentially related to reduced fertility were obtained retrospectively in a structured interview conducted in each respondent's home. Time to pregnancy was ascertained by collecting data on the number of months of unprotected intercourse required to conceive. Women who reported having planned their index pregnancy were asked, "How long (in months) were you trying to become pregnant?" Women with "unplanned" pregnancies were asked when they stopped using birth control before the index pregnancy. Douching data were derived from questions about douching frequency at 1, 2, 3, 4, and 5 years prior to conception of the index pregnancy. At interview, respondents reported one of four douching frequencies for each of the five time periods: (1) never douched, (2) douched no more than twice a year, (3) douched more than twice a year but no more than once a week, or (4) douched more than once a week. The five numbers representing douching frequencies for the 5 years prior to conception were averaged and rounded to the nearest whole number, and the corresponding category was assigned as the douching variable used in the analyses presented here. A second variable based on the four-level douching frequency for the year closest to the time when each woman began attempting pregnancy showed similar associations (data not shown).

Other factors potentially related to fertility included the following: demographic factors (age, race, marital status, education, and family income), self-reported medical factors (prenatal exposure to diethylstilbestrol; history of pelvic inflammatory disease, including postdelivery infection; endometriosis; ovarian cysts; sexually transmitted diseases; and body mass index), reproductive factors (any prior use of oral contraceptives, use of oral contraceptives as last method of contraception, any prior use of an intrauterine device, pregnancy history, age at first sexual intercourse, number of sexual partners, frequency of sexual intercourse, and breast-feeding a child born before the index pregnancy and continuing to do so during at least part of the time to pregnancy), and life-style factors (smoking status and number of cigarettes smoked per day; monthly coffee, tea, soda, cocoa, and alcohol intake; and prior recreational drug use, including marijuana, cocaine, LSD, speed, and "other"). These life-style variables also were collected from each woman for her spouse. Most variables were measured as of the beginning of each woman's noncontracepting time period, but the following were measured as of the time just before conception: family income, education, body mass, usual menstrual cycle length, regularity of menstrual cycle length, frequency of sexual intercourse, number of prior sexual partners, number of cigarettes smoked per day, and monthly coffee, tea, soda, cocoa, and alcohol intake.

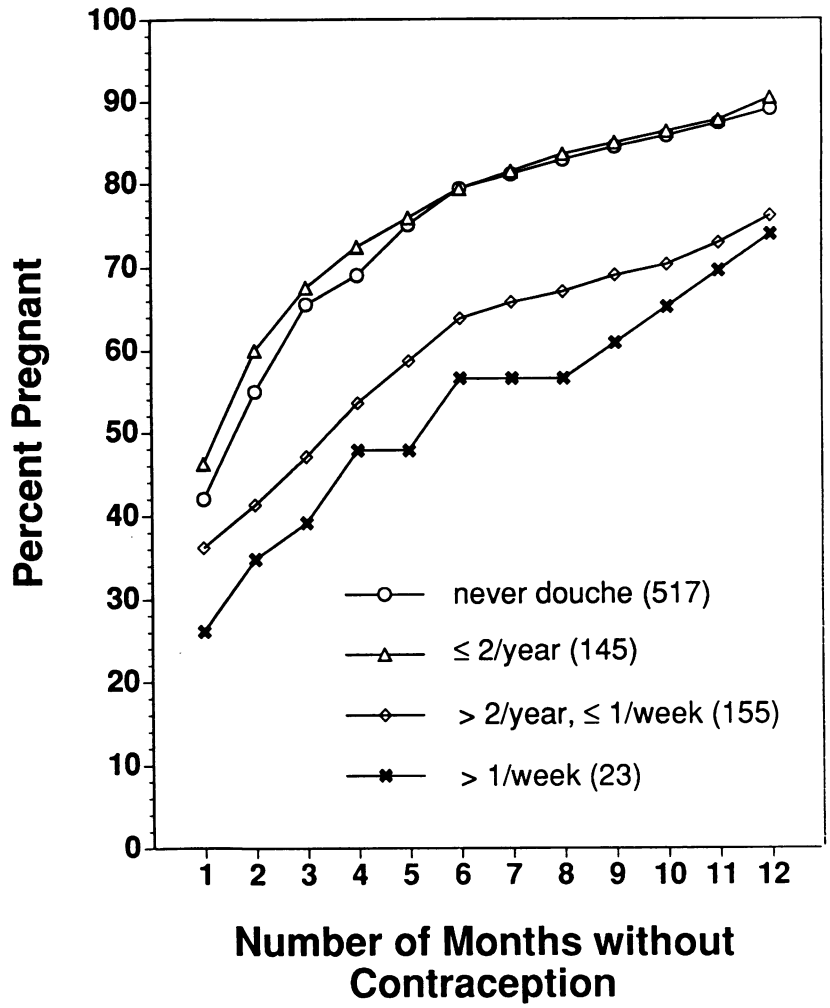


FIGURE 1—Unadjusted cumulative percentage pregnant each month for women in four groups determined by their frequency of douching.

TABLE 1—Prepregnancy Characteristics of 840 Women, by Their Practice of Vaginal Douching during the 5 Years before the Index Pregnancy

	Douchers (n = 178), No. (%)	Nondouchers (n = 662), No. (%)	P
Demographic factors			
Age, y			NS
<20	5 (3)	15 (2)	
20–24	50 (28)	169 (26)	
25–29	93 (52)	328 (50)	
30–34	24 (13)	137 (21)	
35+	6 (3)	13 (2)	
Race (non-White)	16 (9)	39 (6)	NS
Family income, $			NS
<15 000	21 (12)	116 (18)	
15 000–30 000	97 (55)	325 (49)	
>30 000	59 (33)	217 (33)	
Education, y			<.01
<12	6 (3)	10 (2)	
12	48 (27)	135 (20)	
13–15	70 (39)	226 (34)	
≥16	54 (30)	291 (44)	
Marital status (unmarried)	6 (3)	25 (4)	NS
Medical factors			
Prenatal diethylstilbestrol exposure	2 (1)	15 (2)	NS
Prescribed medications	5 (3)	21 (3)	NS
History of pelvic inflammatory disease	8 (4)	28 (4)	NS
History of endometriosis	3 (2)	20 (3)	NS
History of ovarian cyst	9 (5)	52 (8)	NS
History of sexually transmitted diseases	36 (20)	111 (17)	NS
Body mass index, kg/m^2			NS
<20.0 (thin)	69 (39)	224 (34)	
20.0–26.9 (average)	97 (54)	395 (60)	
≥27.0 (obese)	12 (7)	44 (7)	
Reproductive factors			
Recent use of oral contraceptives	70 (40)	232 (35)	NS
Prior use of intrauterine device	42 (24)	126 (19)	NS
Prior use of Dalkon shield	14 (8)	38 (6)	NS
Menstrual cycle length, d			NS
<26	11 (6)	39 (6)	
26–31	89 (50)	371 (56)	
>31	77 (44)	250 (38)	
Prior pregnancies			NS
None	85 (48)	345 (52)	
≥1	93 (52)	317 (48)	
Prior induced abortion[a]	20 (22)	66 (21)	NS
Prior spontaneous abortion[a]	28 (30)	81 (26)	NS
Breast-feeding during time to pregnancy	5 (3)	22 (3)	NS
Frequency of sexual intercourse, times/mo			NS
<8	52 (30)	187 (28)	
8–17	95 (54)	390 (59)	
>17	29 (16)	80 (12)	
Age at first sexual intercourse (<18 yr)	55 (31)	146 (22)	<.05
No. lifetime sexual partners			NS
1–4	131 (74)	513 (78)	
5–9	35 (20)	89 (13)	
10–15	6 (3)	36 (5)	
>15	6 (3)	22 (3)	

(Continued)

To quantify the relationship between douching and reduced fertility, we estimated the fecundability ratio, the ratio of the monthly probability of pregnancy for douchers in comparison with that for nondouchers.[34] Data analysis included descriptive statistics and multivariate modeling. A discrete-time analog of the Cox proportional hazards model[34] was applied to the time to pregnancy data by means of macros developed by Wacholder[35] for the GLIM program.[36] Adjusted fecundability ratios, calculated from the multivariate model, provide a measure of the degree to which a factor is independently associated with fecundability (analogous to risk ratios in studies of chronic diseases). For example, the fecundability ratio associated with douching would be 0.5 if douchers were half as likely as nondouchers to become pregnant in each noncontracepting month. Female factors were modeled first. None of the several male factors that were subsequently modeled changed the relationship between douching and fecundability, so they were dropped in further analyses. Heterogeneity of effect was tested by including cross-product terms in the multivariate model.

Results

Times to pregnancy ranged from 1 month to more than 10 years; 13% of the women required more than a year to conceive. Douching was reported by 38% of the women. Seventeen percent douched very rarely (no more than twice a year). The cumulative pregnancy rate varied by frequency of douching (Figure 1). Women who douched most frequently (more than once a week) had the lowest cumulative pregnancy rate: 27% were still not pregnant after a year. Women who douched more than twice a year but no more than once a week had only slightly higher cumulative pregnancy rates: 24% were still not pregnant after a year. In contrast, cumulative pregnancy rates were high for women who never or rarely douched: only about 10% were still not pregnant after a year.

Because of the similar cumulative pregnancy rates of women who never douched and women who rarely douched, these two groups were combined in further analyses. They are referred to as nondouchers. When the two remaining groups were combined as douchers, their unadjusted monthly probability of pregnancy (fecundability) was about 70% of that for nondouchers (fecundability ratio = 0.68, 95% confidence interval [CI] = 0.58, 0.80). Douchers were similar to nondouchers on most demographic, medical, reproductive, and life-style factors (Table 1). However, douchers did have less education and an earlier age at first intercourse than nondouchers. They also drank more coffee and were more likely to smoke cigarettes. Cigarette smoking was the only one of these characteristics that was also related to reduced fecundability. After adjustment for smoking and seven other factors found to be

related to fecundability (frequency of intercourse, age, menstrual cycle length, breast-feeding, oral contraceptive use as last method of birth control, history of ovarian cysts, and history of LSD use), douchers still had about 70% of the fecundability of nondouchers (fecundability ratio = 0.69, 95% CI = 0.58, 0.80).

The association between douching and reduced fecundability varied significantly with age of the woman ($P < .05$). As shown in Table 2, the adverse effect of douching was greatest in young women (fecundability ratio = 0.50 for women 18 to 24 years of age). Little reduction in fecundability was seen for women 30 years of age and older who douched (fecundability ratio = 0.94).

Douching was associated with reduced fecundability regardless of the reasons given for douching or the reported methods of douching (Figure 2). After covariates had been controlled, the fecundability ratios were similar for women who douched for reasons of cleanliness or habit and for women who douched because of infection or odor (possibly indicative of bacterial vaginosis). Nor was the reduction in fecundability confined to women who douched "immediately" after sexual intercourse. Women were asked what douching preparation they usually used. Water only, water and vinegar, and commercial solutions showed similar reductions in fecundability. Use of a douche bag and use of a disposable douche container were both associated with reduced fecundability, but the association was somewhat stronger for women using the disposable douche container. These patterns were not substantially altered (data not shown) after the age-related differences in effect had been controlled.

To investigate a dose response, we compared the fecundability of very frequent douchers (more than once per week; n = 23) with that of less frequent douchers (more than twice per year but no more than once per week; n = 146) stratified by age. A dose response emerged for women under 25 years of age (fecundability ratio = 0.16, n = 6, for very frequent douchers; fecundability ratio = 0.58, n = 46, for less frequent douchers). No dose dependency was apparent for older women.

TABLE 1—*Continued*

	Douchers (n = 178), No. (%)	Nondouchers (n = 662), No. (%)	*P*
Life-style factors			
Smoking			<.05
Never	99 (56)	405 (61)	
Past	20 (11)	102 (15)	
Current	59 (33)	155 (23)	
Coffee intake, cups/d			<.05
0	60 (34)	255 (39)	
<1.0	28 (16)	89 (13)	
1.0–2.9	38 (21)	185 (28)	
≥3.0	52 (29)	110 (16)	
Alcohol intake, drinks/d			NS
0	53 (30)	249 (38)	
<1.0	76 (43)	279 (42)	
1.0–2.9	42 (24)	120 (18)	
≥3.0	7 (4)	13 (2)	
Recreational drug use	98 (55)	323 (49)	NS
Use of LSD	20 (11)	71 (11)	NS

Note. Because of missing data, sums do not always equal totals.
[a]Among gravid women.

TABLE 2—Reduced Fecundability of Douchers as Measured by the Adjusted Fecundability Ratio, by Age Group

Age Group, y	No. Douchers	Fecundability Ratio[a]	95% Confidence Interval
18–24	52	0.50	0.35, 0.70
25–29	90	0.71	0.57, 0.90
30–39	27	0.94	0.68, 1.31

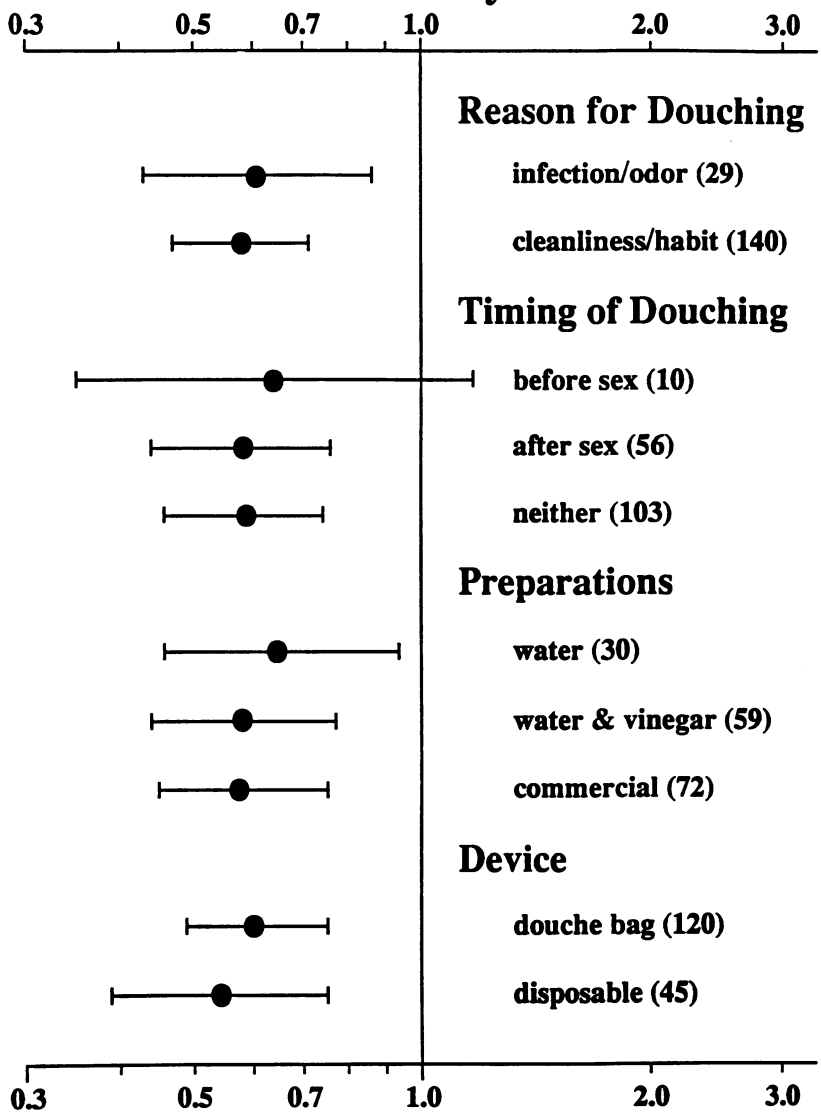
[a]Adjusted for frequency of sexual intercourse, use of oral contraceptives as last method of birth control, history of ovarian cyst, menstrual cycle length, breast-feeding during time of trying to conceive, cigarette smoking, and history of LSD use.

Discussion

We observed a significant association between vaginal douching and reduced fertility ($P < .001$) in a sample of 840 married, parous women. This relationship would be expected if douching were done to alleviate vaginal symptoms of genital infections (the infections being the real cause of infertility). However, this potential bias may not explain our results. First, national survey data on why women douche indicate that most douchers start douching when they are young and do so for nonmedical reasons.[3,37] Second, women in our study were asked their reasons for douching. Excluding from analysis the 17% of our sample who reported ever douching because of infection or odor (a symptom of undiagnosed bacterial vaginosis) did not change our results. Finally, douchers in our study were not more likely than nondouchers to report a history of genital infections (17% and 20%, respectively).

Although douching is not an effective method of contraception, it might be associated with somewhat reduced fertility because women who use douching for contraception may be relatively subfertile (an ineffective method of contraception appears to work for them, so they continue to use it) or because douching immediately after intercourse might possibly acutely reduce sperm transport. The women in our sample were not asked specifically whether they douched for contraception, but they were asked whether they douched after intercourse. The majority did not, and douching was related to reduced fertility regardless of the timing (Figure 2), indicating that factors other than these contraception-related issues account for the observed association.

The issue of uncontrolled confounding has been raised regarding reported associations between douching and pelvic infection and tubal pregnancy. It is also a concern in this study. Although everyone in our sample was married and parous,



Note. The numbers in parentheses represent the number of douchers in each group. The comparison group in all cases was nondouchers (women who douched no more than twice a year; n = 649). As an example, the women who douched because of infection or odor had 61% of the fecundability of nondouchers; likewise, women who douched for cleanliness or out of habit had similarly reduced fecundability in comparison with nondouchers.

FIGURE 2—Adjusted fecundability ratios (with 95% confidence intervals) for groups of women with different douching habits.

the douchers in our study tended to be less well educated than nondouchers, just as seen in national samples. However, when we controlled for this potential confounder in analysis, it did not change the observed association between douching and reduced fertility. Also, controlling for any of the other many variables collected in the extensive personal interview did not change the association. However, all variables were self-reported, including the medical data. No clinical evaluation was made of the participants or their spouses, so we were unable to control for poor semen characteristics or documented medical problems in the women.

Information bias from retrospectively collected time to pregnancy data is another concern. The women in this study were interviewed 1 to 16 years after they began trying to conceive (median of 4 years). Even though the interviewers recorded each woman's contraceptive and pregnancy history month by month starting with age at first sexual intercourse, some reporting errors in the time to pregnancy data are inevitable. Therefore, we conducted a confirmatory analysis with a dichotomous measure less susceptible to misclassification. Women were categorized as infertile if they required more than a year to conceive, the standard clinical definition of infertility. The odds ratio (OR) for infertility associated with douching was estimated by means of logistic regression to control for the same covariates used in the fecundability analysis. A strong association again emerged, with douchers being nearly three times more likely than nondouchers to experience clinical infertility (OR = 2.9, 95% CI = 1.9, 4.6).

Misclassification of douching frequency is also unlikely to account for the observed association. Women were asked to report their frequency of douching at five points in time: 1, 2, 3, 4, and 5 years before conception. When analyzed separately, douching at each of the five time points was associated with significant reduction in fertility. Moreover, when these data were used to derive a variable that best reflected each woman's douching status at the time she started trying to conceive, this measure of douching was also significantly related to reduced fertility. This indicates that subfertile women began douching before they were aware of a fertility problem, not in response to it.

If douching does reduce fertility, the mechanism for such an effect is unclear. Absorption of chemicals in douching preparations is a concern,[38] but few data are available. One study found that frequent use of medicated douches containing povidone-iodine can result in iodine overload,[39] and a case of disturbed thyroid function has been reported in a breast-fed infant due to maternal use of povidone-iodine-containing douches.[40] In our data, we found no evidence that commercial preparations produced any greater reduction in fertility than a combination of water and vinegar prepared at home. Even water alone was associated with significant reduction in fertility. This suggests that the mechanical process of douching per se may have adverse effects.

Cramer et al. suggested that douching may increase the risk of endometriosis by increasing retrograde menstruation.[41] Few women in our sample had been diagnosed with endometriosis, and douchers were not more likely to report being diagnosed with the condition than nondouchers (2% of douchers vs 3% of

nondouchers). However, undiagnosed endometriosis could be a mediating factor. Alternatively, simply the introduction of fluid into the uterine cavity might initiate uterine or tubal changes that interfere with implantation.

Other data indicate that infectious agents might mediate an association between douching and reduced fertility, including several epidemiologic studies that have linked douching to increased risk of pelvic inflammatory disease.[4,10,13–17] Pelvic inflammatory disease generally arises from the spread of lower tract infections,[42] and douching may enhance the spread by mechanically propelling pathogens to the cervix or changing the vaginal environment.[43] Consistent with the latter, douching has been found to affect numbers of vaginal flora[44] and, specifically, to reduce vaginal lactobacilli, the bacteria that defend against genital pathogens by their normal production of hydrogen peroxide.[45] Tubal infertility is a documented sequela of pelvic inflammatory disease (poor gamete transport results from scarring of fallopian tube epithelium).[46] It also has been suggested that pelvic inflammatory disease might reduce fertility by interfering with implantation through some immune response to current or past uterine infection.[47]

Rates of self-reported, physician-diagnosed pelvic inflammatory disease were very low for both douchers and nondouchers in this study (4% of both groups). Controlling for pelvic inflammatory disease did not substantially change the observed association between douching and reduced fertility, suggesting that this variable was not a mediator in our sample. However, subclinical pelvic infection probably is more common than diagnosed disease,[46] and we have no data to examine its effect on the observed association.

The increased risk associated with douching in young women relative to older women in our study may be an artifact of our methodology of using birth certificates as the sampling unit. Women who attempt pregnancy at an older age are less likely than younger women to conceive and give birth, and this selective exclusion might make it more difficult to see a relationship between douching and reduced fertility among the older participants in our study. Alternatively, the higher risk in the young could reflect their possibly increased susceptibility to sexually transmitted diseases (e.g., younger women have higher rates of cervical ectopy and more frequent changes in sexual partners).

If the adverse effect of douching is mediated by infections with sexually transmitted organisms, we would expect douching to show little association with reduced fertility in women with little or no exposure to sexually transmitted organisms. We cannot test this hypothesis with data from our study. Data on numbers of sex partners were collected in categories such that monogamous women could not be identified, and biological samples to evaluate antibody titers were not collected. Only 3% of our sample reported chlamydia or gonorrhea infections, and controlling for this had little effect on the relationship. Ability to identify monogamous women (whose partners were also monogamous) and information on infection history from antibody titers will be useful in future studies.

The women in this study were predominantly White (93% White, 2% Black, 2% Asian, and 3% other), and they were better educated (40% had college educations) than the US population as a whole. Consistent with these differences, only 21% of our sample douched regularly, as compared with 37% of the US population (or 32% of the US White population).[10] Among those who douched, frequency of douching was also lower (13% douched more than once a week, in comparison with 29% of douchers in the US population). Our sample was also selected on being able to conceive; irreversible infertility problems, such as bilateral tubal occlusion, were not represented. Thus, if douching does have adverse effects, these effects will be magnified in a more representative group of women.

Further study of vaginal douching is needed, including investigation of mechanisms by which douching might reduce fertility. Douching is viewed by many women in the United States, especially Black women, as an accepted feminine hygiene practice. Given the reported associations with pelvic infections, tubal pregnancies, and infertility, women need to be informed that douching may have adverse effects. □

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References

1. Finch BE, Green H. *Contraception through the Ages.* Springfield, Ill: Charles C Thomas Publisher; 1963.
2. Whitson GE, Ellis FA. Vaginal douches. *SD J Med Pharmacol.* 1948;1:217–226.
3. Stock RJ, Stock ME, Hutto JM. Vaginal douching: current concepts and practices. *Obstet Gynecol.* 1973;42:141–146.
4. Forrest KA, Washington AE, Daling JR, Sweet RL. Vaginal douching as a possible risk factor for pelvic inflammatory disease. *J Natl Med Assoc.* 1989;81:159–165.
5. Daling JR, Weiss NS, Schwartz SM, et al. Vaginal douching and the risk of tubal pregnancy. *Epidemiology.* 1991;2:40–48.
6. West C. *Lectures on the Diseases of Women.* Philadelphia, Pa: Blanchard & Lea; 1858.
7. Webster JC. *A Text-Book of Diseases of Women.* Philadelphia, Pa: WB Saunders Co; 1907.
8. Fothergill WE. The bad habit of vaginal douching. *BMJ.* 1918;1:445–446.
9. Barnes J. Uses and abuses of vaginal douching. *Practitioner.* 1960;184:668–670.
10. Aral SO, Mosher WD, Cates W Jr. Vaginal douching among reproductive age women in the United States: 1988. *Am J Public Health.* 1992;82:210–214.
11. Stergachis A, Scholes D, Heidrich FE, et al. Selective screening for *Chlamydia trachomatis* infection in a primary care population of women. *Am J Epidemiol.* 1993;138: 143–153.
12. Scholes D, Stergachis A, Heidrich FE, et al. Vaginal douching and risk of *C. trachomatis* infection. *Am J Epidemiol.* 1995;141: S24. Abstract.
13. Neumann HH, DeCherney A. Douching and pelvic inflammatory disease. *N Engl J Med.* 1976;295:789.
14. McGregor JA, Spencer NE, French JI, et al. Psychosexual and behavioral risk factors for acute salpingitis. In: Proceedings of the Sixth International Meeting of the International Society for STD Research; July 31–August 2, 1985; Brighton, England.
15. Wolner-Hanssen P, Eschenbach DA, Paavonen J, et al. Association between vaginal douching and acute pelvic inflammatory disease. *JAMA.* 1990;263:1936–1941.
16. Aral SO, Mosher WD, Cates W Jr. Self-reported pelvic inflammatory disease in the United States, 1988. *JAMA.* 1991;266: 2570–2573.
17. Scholes D, Daling JR, Stergachis A, et al. Vaginal douching as a risk factor for acute pelvic inflammatory disease. *Obstet Gynecol.* 1993;81:601–606.
18. Chow W-H, Daling JR, Weiss NS, Moore DE, Soderstrom R. Vaginal douching as a potential risk factor for tubal ectopic pregnancy. *Am J Obstet Gynecol.* 1985;153: 727–729.
19. Chow JM, Yonekura ML, Richwald GA, Greenland S, Sweet RL, Schachter J. The association between *Chlamydia trachomatis* and ectopic pregnancy: a matched-pair, case-control study. *JAMA.* 1990;263:3164–3167.
20. Kendrick JS, Atrash HK, Strauss LT, Gargiullo PM. Vaginal douching and risk

of ectopic pregnancy among black women. *Am J Epidemiol.* 1995;141:S25. Abstract.
21. Phillips RS, Tuomala RE, Feldblum PJ, et al. The effect of cigarette smoking, *Chlamydia trachomatis* infection, and vaginal douching on ectopic pregnancy. *Obstet Gynecol.* 1992;79:85–90.
22. Peters RK, Thomas D, Hagan DG, Mack TM, Henderson BE. Risk factors for invasive cervical cancer among Latinas and non-Latinas in Los Angeles County. *JNCI.* 1986;77:1063–1077.
23. Gardner JW, Schuman KL, Slattery ML, Sanborn JS, Abbott TM, Overall JC. Is vaginal douching related to cervical carcinoma? *Am J Epidemiol.* 1991;133:368–375.
24. Brinton LA, Nasca PC, Mallin K, et al. Case-control study of in situ and invasive carcinoma of the vagina. *Gynecol Oncol.* 1990;38:49–54.
25. Mueller BA, Luz-Jimenezx M, Daling JR, et al. Risk factors for tubal infertility: influence of history of prior pelvic inflammatory disease. *Sex Transm Dis.* 1992;19: 28–34.
26. Hirsch MB, Mosher WD. Characteristics of infertile women in the United States and their use of infertility services. *Fertil Steril.* 1987;47:618–625.
27. Baird DD, Wilcox AJ, Weinberg CR. Use of time to pregnancy to study environmental exposures. *Am J Epidemiol.* 1986;124: 470–480.
28. Linn S, Schoenbaum SC, Monson RR, Rosner B, Ryan KJ. Delay in conception for former 'pill' users. *JAMA.* 1982;247:629–632.
29. Baird DD, Wilcox AJ. Cigarette smoking associated with delayed conception. *JAMA.* 1985;253:2979–2983.
30. Howe G, Westhoff C, Vessey M, Yeates D. Effects of age, cigarette smoking, and other factors on fertility: findings in a large prospective study. *BMJ.* 1985;290:1697–1700.
31. Rachootin P, Olsen J. The risk of infertility and delayed conception associated with exposures in the Danish workplace. *J Occup Med.* 1983;25:394–402.
32. Rowland AS, Baird D, Weinberg CR, Shore DL, Shy CM, Wilcox AJ. Reduced fertility among women employed as dental assistants exposed to high levels of nitrous oxide. *N Engl J Med.* 1992;327:993–997.
33. Daling JR, Weiss NS, Metch BJ, et al. Primary tubal infertility in relation to the use of an intrauterine device. *N Engl J Med.* 1985;312:937–941.
34. Weinberg CR, Wilcox AJ, Baird DD. Reduced fecundability in women with prenatal exposure to cigarette smoking. *Am J Epidemiol.* 1989;129:1072–1078.
35. Wacholder S. Binomial regression in GLIM: estimating risk ratios and risk differences. *Am J Epidemiol.* 1986;123:174–184.
36. Payne CD, ed. *The GLIM System Release 3.77 Manual.* Oxford, England: Numerical Algorithms Group; 1986.
37. Chacko MR, McGill L, Johnson TC, Smith PB, Nenney SW. Vaginal douching in teenagers attending a family planning clinic. *J Adolesc Health Care.* 1989;10:217–219.
38. Vaginal drug products for over-the-counter human use; establishment of a monograph; advance notice of proposed rulemaking. *Federal Register.* October 13, 1983;48:46693–46729.
39. Mahillon I, Peers W, Bourdoux P, Ermans AM, Delange F. Effect of vaginal douching with povidone-iodine during early pregnancy on the iodine supply to mother and fetus. *Biol Neonate.* 1989;56:210–217.
40. Rakover Y, Adar H. Thyroid function disturbances in an infant following maternal topical use of polydine. *Harefuah.* 1989;116:527–529.
41. Cramer DW, Wilson E, Stillman RJ, et al. The relation of endometriosis to menstrual characteristics, smoking and exercise. *JAMA.* 1986;255:1904–1908.
42. Westrom L. Pelvic inflammatory disease: bacteriology and sequelae. *Contraception.* 1987;36:111–128.
43. Rosenberg MJ, Phillips RS. Does douching promote ascending infection? *J Reprod Med.* 1992;37:930–938.
44. Onderdonk AB, Delaney ML, Hinkson PL, DuBois AM. Quantitative and qualitative effects of douche preparations on vaginal microflora. *Obstet Gynecol.* 1992;80: 333–338.
45. Hillier SL. The vagina as an ecosystem. In: Proceedings of the Ninth International Meeting of the International Society for STD Research; October 6–9, 1991; Banff, Alberta, Canada.
46. Moore DE, Cates W Jr. Sexually transmitted diseases and infertility. In: Holmes KK, Mardh P-A, Sparling PF, et al., eds. *Sexually Transmitted Diseases.* 2nd ed. New York, NY: McGraw-Hill International Book Co; 1990:763–769.
47. Morell V. Attacking the causes of "silent" infertility. *Science.* 1995;269:775–777. News.

Call for Abstracts for Epidemiology Late-Breaker Sessions

Oral Exchange Session

The Epidemiology Section will sponsor a late-breaker epidemiology oral exchange session on Wednesday, November 20, 1996, during the American Public Health Association's 1996 annual meeting in New York, NY. The exchange will provide a forum for oral presentation of investigations, analyses, or methods that have been conceived, conducted, and/or completed so recently that authors could not meet the deadline for regular submission to other epidemiology sessions.

Abstracts of fewer than 250 words (any format) and a stamped, self-addressed return envelope should be submitted to John M. Horan, MD, MPH, Chief, State Branch, Division of Field Epidemiology, EPO, Centers for Disease Control and Prevention, Mailstop C-08, 1600 Clifton Rd, Atlanta, GA 30333; (404) 639-3689.

Abstracts must be received by *September 27, 1996.* Decisions will be made by November 7, 1996.

Poster Session

The Epidemiology Section will again sponsor a late-breaker poster session on Wednesday, November 20, 1996, at the APHA annual meeting in New York, NY. This session permits the presentation of work that has been completed too late in the last year for regular paper submission. Abstracts should report on work conducted during the past year.

Along with a stamped, self-addressed return envelope, abstracts of less than 250 words (any format) should be submitted to Cathey Falvo, MD, MPH, Graduate School of Health Science, Learning Center–310, New York Medical College, Valhalla, NY 10595; (914) 993-4250.

Abstracts must be received by *September 27, 1996.* Decisions will be made by November 7, 1996.